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NHI Web-based Training Standards and Style Guide

NATIONAL HIGHWAY INSTITUTE

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1. Introduction

The National Highway Institute (NHI) Web-based Training Standards and Style Guide provides the standards to be followed when developing Web-based Training (WBT) for the National Highway Institute.

This Guide focuses on the following areas:

- General Courseware Development Standards
- WBT Development and Delivery Environment
- Instructional Design Standards
- Graphical User Interface - Menu and Navigation
- Adobe Breeze Settings
- Media Standards
- Technical Standards
- Writing Standards
- Assessment Standards
- Section 508 Compliance
- Quality Assurance
- Learning Management System Integration
- Adobe Breeze Resources

For clarification of these standards or for permission to deviate from NHI standards, contact the Knowledge Application Team at (703) 235-0500.

2. NHI WBT Process and Deliverables

Development Process

WCT courseware will be developed using the Instructional Systems Design (ISD) process, sometimes known as the ADDIE process. Phases of this process include:

1. Analysis
2. Design
3. Development
4. Implementation
5. Evaluation

Development Team

It is NHI's expectation that a fully-qualified instructional systems designer will be responsible for the development of analysis and design phase deliverables. In the appropriate phases of the project, NHI expects the instructional systems designer to work with a multi-disciplinary team that includes:

- Subject Matter Expert(s)
- Content Reviewer(s) (also Subject Matter Experts)
- Graphic Artist(s)
- Quality Assurance Specialist(s)
- NHI Instructional Systems Designer(s)
- Web Developer(s)/Programmer(s) *
- Audio/Video Producer(s) **

* Adobe Breeze Presenter does not require the use of a Web Developer/Programmer. However, a Flash programmer/developer is needed to develop custom interactions.

** An audio/video producer is needed when custom audio or video is added to the PowerPoint presentation.

Deliverables

The following should be specified as deliverables in contracts for custom e-Learning courseware development:

PHASE	DELIVERABLE(s)
Planning	Work Plan (tasks, resources, start/end dates, dependencies)
Analysis	High-level Design Plan (approach, scope, outcomes)
Design	Prototype Storyboards and Published Prototype (approx. 20 slides) Detailed Design Plan (instructional strategies, media)
Development	Detailed PowerPoint Slides and Audio Scripts All Media Beta Published Courseware
Implementation	Final Published Courseware and Source Files, LMS Testing
Evaluation*	Test Items as submitted in Beta and Final Courseware

**NHI will provide a standard NHI Level 1 course evaluation form. (not yet available)*

Samples of each of these deliverables will be provided upon request.

FHWA shall hold ownership of the final courseware, including the PowerPoint, audio, video, Flash (.FLA) and graphic files.

Analysis Phase Process and Deliverables

NHI expects designers/developers to analyze the business driver(s), target audience needs, content, budget, timeline and delivery options as part of the Analysis Phase of any WBT development project.

Designers/developers are expected to submit Analysis Phase findings and recommendations in a High-level Design Plan. NHI expects the design of the course to be instructionally sound (defined as job relevant, task-based, problem-centered, interactive, engaging and well-organized).

The following should be provided in the High-Level Design Plan:

- Statement of Business Need
- Target Audience Characteristics
- Delivery Systems to be used, if blended approach is recommended
- Course Goal(s)
- Course Learning Outcomes (Terminal Learning Objectives)
- Overarching Instructional Approach (e.g., theme, metaphor)
- Course Structure (diagrams of modules, showing chunking and sequence of instruction)
- Use of media (animation, audio, video), if recommended
- Estimated Course Duration, by module
- Course Delivery Recommendation

The High-level Design Plan should be submitted to NHI in an MS Word 2000 file.

The designer/developer should plan to meet with NHI (either in a face-to-face or in a Web conference) to present the high-level design for the WCT course.

All NHI feedback to the draft High-level Design Plan will be incorporated into a Final High-level Design Plan.

Design Phase Process and Deliverables

Detailed Design Plan. NHI requires designers/developers to develop a Detailed Design Plan. The purpose of the design plan is to indicate to NHI how the content will be mapped to the objectives and how the content will be presented, practiced and tested.

The following should be provided in the Detailed Design Plan:

- Course Goal(s)
- Course Learning Outcomes (Terminal Learning Objectives)
- Module Titles
- Module Objectives (Enabling Learning Objectives)
- Content mapped to each Objective (in bulleted or outline format)
- Graphical treatment of content
- Specific use of audio and/or video if recommended
- Description of any pre-work and homework assignments
- Course Duration, by module (revised estimate)
- When, if any, narration will be used
- When, if ever, an instructor will interact with online learners

The draft Detailed Design Plan should be submitted to NHI in an MS Word 2000 file.

All NHI feedback to the draft Detailed Design Plan will be incorporated into a Final Detailed Design Plan.

Prototype. Also as part of the Design Phase, NHI requires a short (approximately 20 slides) prototype in Breeze Presenter. The purpose of the prototype is to illustrate:

- Creativity
- Adherence to standards
- Accuracy of content
- Visual treatment of content
- Writing style

Ways to deliver prototype to NHI (please coordinate with NHI ISD):

- CD-ROM (asynchronously)
- Web Conference (synchronously)
- Breeze Central URL (please coordinate with NHI ISD)

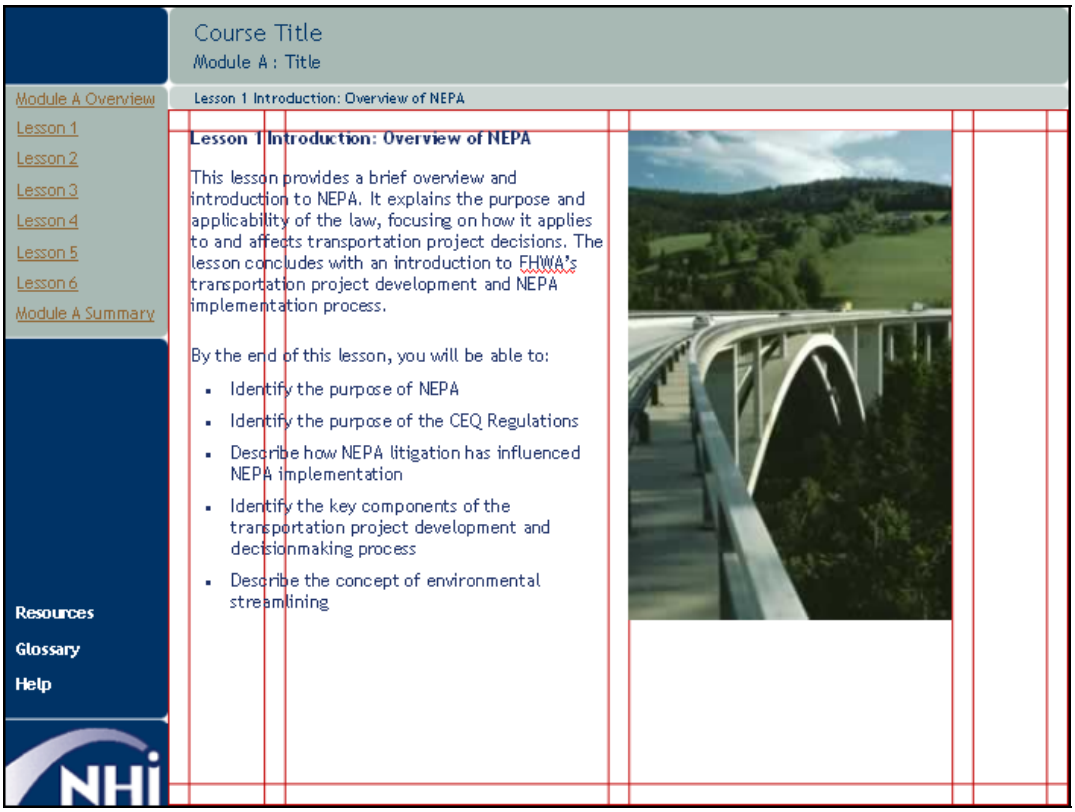
All NHI feedback to the draft prototype will be incorporated into a Final Prototype, delivered to NHI as a .ppt file.

Development Phase Process and Deliverables

NHI WBT Template

Before starting the development phase, the contractor must obtain the latest version of the NHI WBT Template to use in conjunction with this style guide. (URL to come)

Template Example



The background that is supplied in the template includes a grid. Please use this background and grid to layout each slide. The background can easily be replaced before publishing. (See the section on screen design)

Draft PowerPoint Slide Presentation. The designer/developer will create a set of draft PowerPoint slides that includes

- script (verbatim) included in the Notes section of PowerPoint
- at least 1 quiz
- script for custom audio/video included in the Notes section of PowerPoint (if any)

Each draft module and draft module test should be delivered as a separate .ppt file.

The designer/developer will submit the draft PowerPoint files and any ancillary files for review and comment.

The following file naming conventions are to be used for the draft deliverables:

Each module .ppt file	Course Number_Module Title_Draft_MonthYear
Each module test .ppt file	Course Number_Module Title_Test_Draft_MonthYear

The title of the module should be abbreviated in the file name.

NHI will provide written, consolidated feedback, which the designer/developer will incorporate into the materials to create the pilot-ready version of all course materials.

Implementation Phase Deliverables

NHI will coordinate and conduct a pilot of the WBT with representative members of the target audience.

Pilot-ready Materials. The designer/developer will create:

- Published PowerPoint file for each module
- Published PowerPoint file for each module test
- Script (included in the Notes section within PowerPoint)
- Any ancillary material as recommended in the High-Level or Detailed Design Plans

The following file naming conventions are to be used for the final deliverables:

Each module .ppt file	Course Number_Module Title_Pilot_MonthYear
Each module test .ppt file	Course Number_Module Title_Test_Pilot_MonthYear
Facilitator Guide	Course Number_Module Title_FG_Pilot_MonthYear
Participant Guide	Course Number_Module Title_PG_Pilot_MonthYear
Script	Course Number_Script_Pilot_MonthYear

The designer/developer should plan to attend the pilot and capture feedback. The designer/developer will submit Facilitator and Participant feedback to NHI in an MS Word document within two days of the pilot. NHI will review the feedback and decide which feedback to implement and which to set aside.

Post-pilot changes to the WBT. The designer/developer will create a set of final course materials that include all mutually agreed-upon changes that resulted from the pilot.

The following file naming conventions are to be used for the final deliverables:

Each published module	Coursenumber_moduleX
All supporting files (.swf)	Coursenumber_moduleX_screenxx_xx
Each published module test	Coursenumber_moduleXtest
Each module .ppt file	Coursenumber_moduleX_Final_MonthYear
Each module test .ppt file	Coursenumber_moduleX_Test_Final_MonthYear
All original supporting files (.fla)	Coursenumber_moduleX_screenxx_xx

Evaluation Phase Process and Deliverable

NHI will manage the collection and analysis of Level 1 (learner reactions) and Level 2 (learner knowledge and skill acquisition) data.

The designer/developer will coordinate and facilitate a one-hour Lessons Learned meeting within two weeks of completion of the project. The meeting may be held virtually. The designer/developer will document lessons learned and submit a brief Lessons Learned document in MS Word.

3. Instructional Design Standards

General Standards

Use the following general standards:

- Design for the following hierarchy: course, module, lesson
- State learning outcomes (at course and module levels)
- Allow learner to navigate (select from left-hand menu or by using the sidebar within a published Breeze presentation)
- Create the shortest module and lesson titles needed to convey meaning
- Include a glossary
- Include a resource feature, if the learner will need or benefit from a collection of documents, a bibliography, or list of relevant Web resources
- Include a "help" segment on how to use the courseware
- Write a module welcome page text and lesson welcome page text
- Design modules that are no more than 30 minutes in duration (approximately 25-35); exceptions to this standard may be approved by NHI
- Begin each module and lesson with something compelling (e.g., startling statistic, powerful quote, compelling story) that will create a tension for learning (provide the "what's in it for me")
- Provide estimated completion time on the module welcome page and lesson welcome page
- Include a module summary page and lesson summary page
- Provide introductory statements, transitional statements, and summary statements as needed to ensure a coherent flow across pages
- Do not assume that the learner will take modules or lessons in any particular order (If knowledge from a previous lesson or from the learner's work experience is needed to understand the new ideas that will be presented in the lesson, provide a brief summary of this knowledge.)
- Address one concept, procedure or item of instruction on each page
- Provide verbatim audio script text in the Notes section, if audio is used
- Place instructions on how to interact with the instructional area (e.g., select all that apply) in the instructional area of the screen
- Provide learners with information in the fewest steps and shortest time possible
- Use custom illustrations and interactions to teach complex concepts
- Use royalty-free graphics and photographs to add visual interest
- Avoid stereotyping by race, gender or ethnicity; model diversity

- End each lesson with a summary that summarizes the content and ties it back to the relevant learning outcomes (i.e., learning objectives)

- Develop module-level assessments; test every terminal learning objective (module-level assessments are created as a separate .ppt file)

- End the course with a summary that reiterates the course goals and instructs learners to complete the Level 1 course evaluation

Levels of Interactivity

The level of interactivity to be provided in the courseware is agreed upon and documented in the work plan and further described in the analysis/design documents.

NHI uses the following definitions to describe the degree of interactivity that will be included in courseware:

- **Level I** – Passive. The learner acts solely as a receiver of information. The learner progresses linearly through course reading text from the screen, viewing video or listening to audio.

- **Level II** – Limited Interaction. The learner makes simple responses to instructional cues. The responses may include answering multiple choice or true/false questions. An example that NHI has standardized is called "Knowledge Checks" which are not graded.

- **Level III** – Complex Participation. The learner makes a variety of responses using varied techniques in response to instructional cues. Techniques may include building a model/diagram from available parts.

NHI understands that decisions on the degree of interactivity in any e-Learning product are based upon relative importance of the content, budget, timeline, shelf life, and audience size. Minimally, NHI expects learners to interact with the courseware every four pages.

Note: It may be appropriate to design modules within the same course for different levels of interactivity (e.g., one module may focus on foundational principles and another module may use complex, branched case studies for application of those principle; the foundational module might be developed at Level I, whereas the application module might be developed at Level III).

Use of Interactivity to Present Instruction and Enable Practice

- Engage the learner as frequently as possible through the use of interactive teaching strategies (e.g., an "Explore It" interaction where the learner clicks on several text labels, graphical elements, or photographs for further information)
- Include a wide variety of screen (interaction) types to keep the learner engaged throughout the course
- Develop and adhere to a standard set of instructions (learner prompts) for each screen (interaction) type

Embedded Practice

Use these standards to design and develop embedded practice exercises:

- Provide opportunities for unscored practice after each concept or skill is taught
- Provide the context for the practice activity (relate it to a concept or job skill in introductory text)
- Ensure that practice opportunities are directly linked to learning outcomes (i.e., terminal and/or enabling learning objectives)
- Use the standard NHI screen for embedded practice exercises
- Provide first try and second try feedback for practice exercises; provide feedback on why answers are incorrect; provide correct answer

Learner Feedback/Remediation

Use these standards to write feedback for embedded practice exercises:

- Provide corrective feedback that enables learning
- With feedback is gradually as the learner practices the new concepts/skills
- Provide two tries to answer correctly
- Provide the learner with a "hint" if the learner answers incorrectly on the first try. Encourage the learner to try again
- Provide the learner with the correct answer if the learner responds with an incorrect answer on the second attempt
- Avoid using phrases such as "You are incorrect" or "That's wrong." Instead, use "Incorrect" followed by feedback that provides the learner with a hint prior to attempting the question for a second time
- Use "Correct" when the learner answers correctly; add additional language that paraphrases the correct answer

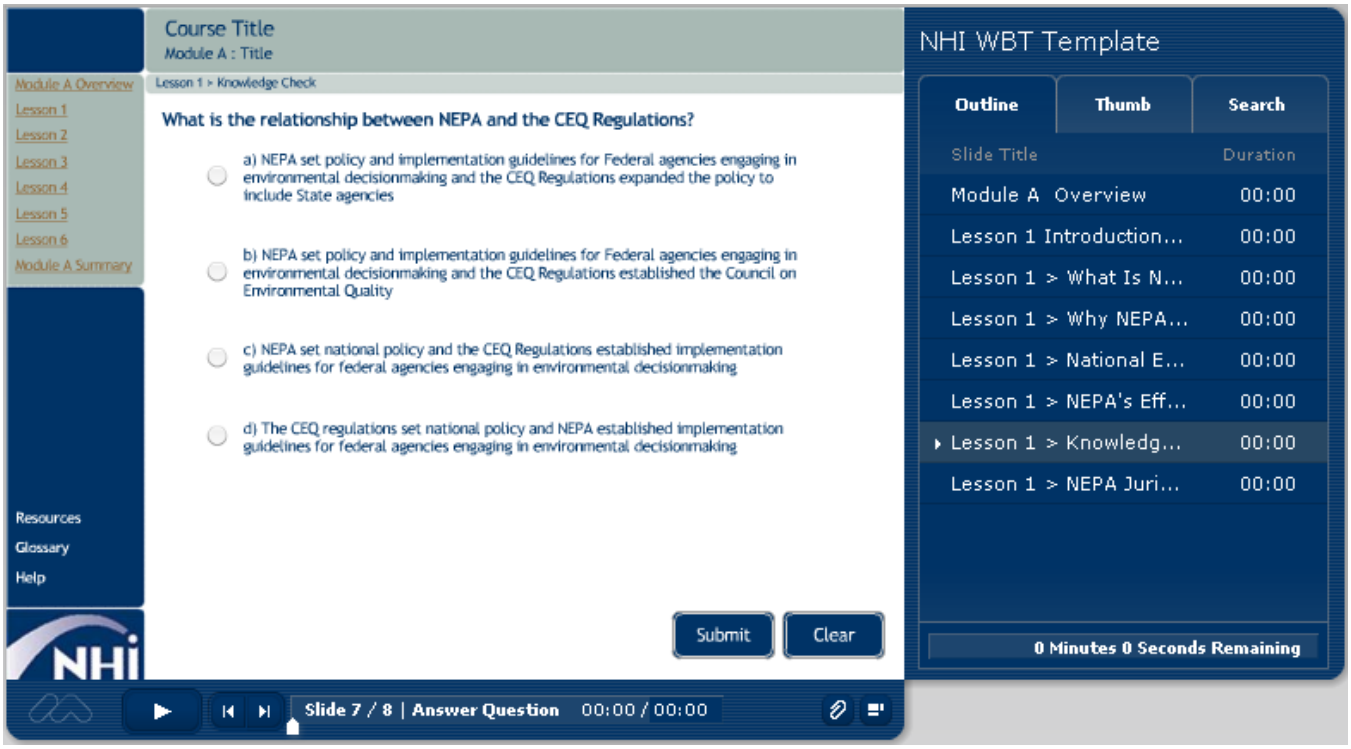
Standard NHI WBT Screen Types

Module Intro Page. The module intro page orients the learner to the module. Most importantly, it captures the learner's attention and creates a tension for learning. This page should provide the What's In It for Me? (WIIFM). The estimated contact time (module duration) is provided.

Lesson Intro Page. The lesson intro page orients the learner to the lesson. Lesson learning outcomes are stated.

Knowledge Check. Use the standard Knowledge Check screen for all unscored, embedded practice exercises

- Up to 5 possible answer choices can be listed, for multiple choice questions
- Check boxes are used when more than one choice can be made; in this case, use the terminology "select all that apply" in the instructional text after the question



Lesson Summary Page. The lesson summary page wraps up the lesson. Lesson learning outcomes are paraphrased. This page also provides instruction on how to continue (e.g., select another lesson). If desired, one (the same) graphic may be used on every lesson summary page in a course.

[paste screen grab here] NO SAMPLE YET AVAILABLE

Module Test Intro Page. The module test intro page orients the learner to the module assessment. Clear instructions on how to take the test are provided. The number of questions in the test is stated. The test scoring page is explained. The learner is informed that the threshold for mastery is 70% for each module test. This page also provides instruction on how to start the test (i.e., select the Next button). If desired, one (the same) graphic may be used on every module test intro page in a course.

[paste screen grab here] NO SAMPLE YET AVAILABLE

Module Test Summary Page. The module test summary page is the module "scorecard" for the learner. The learner's score on the module test is provided (expressed as a percentage). The learner is informed, in text, whether or not he/she passed the test.

Every objective in the module is listed on the summary page. Next to the objective, the learner is informed whether he/she answered the question correctly. The learner is encouraged to revisit the lessons, if he/she does not get the associated topic question correct.

The following represents the information to be provided on the module test summary page.

Test Question	Objective Tested		Lesson Title	Topic Title
1	xxxxxxx	x	xxxxxxx	xxxxxx
2	xxxxxxx	✓	xxxxxxx	xxxxxx
3	xxxxxxx	x	xxxxxxx	xxxxxx
4	xxxxxxx	✓	xxxxxxx	xxxxxx
5	xxxxxxx	✓	xxxxxxx	xxxxxx

When the learner gets 70% or higher on all module tests within a course, he/she is instructed to go to the Course Summary page.

[paste screen grab here] NO SAMPLE YET AVAILABLE

Course Summary Page. The course summary page wraps up the entire course. The most important take-aways of the course are stated in paragraph form. The learner may be encouraged to access the Resources in the course (on the job). Most importantly, the learner is encouraged to complete the Level 1 course evaluation (method of access TBD).

[paste screen grab here] NO SAMPLE YET AVAILABLE

3. WBT Development and Delivery Environment

Development Tools

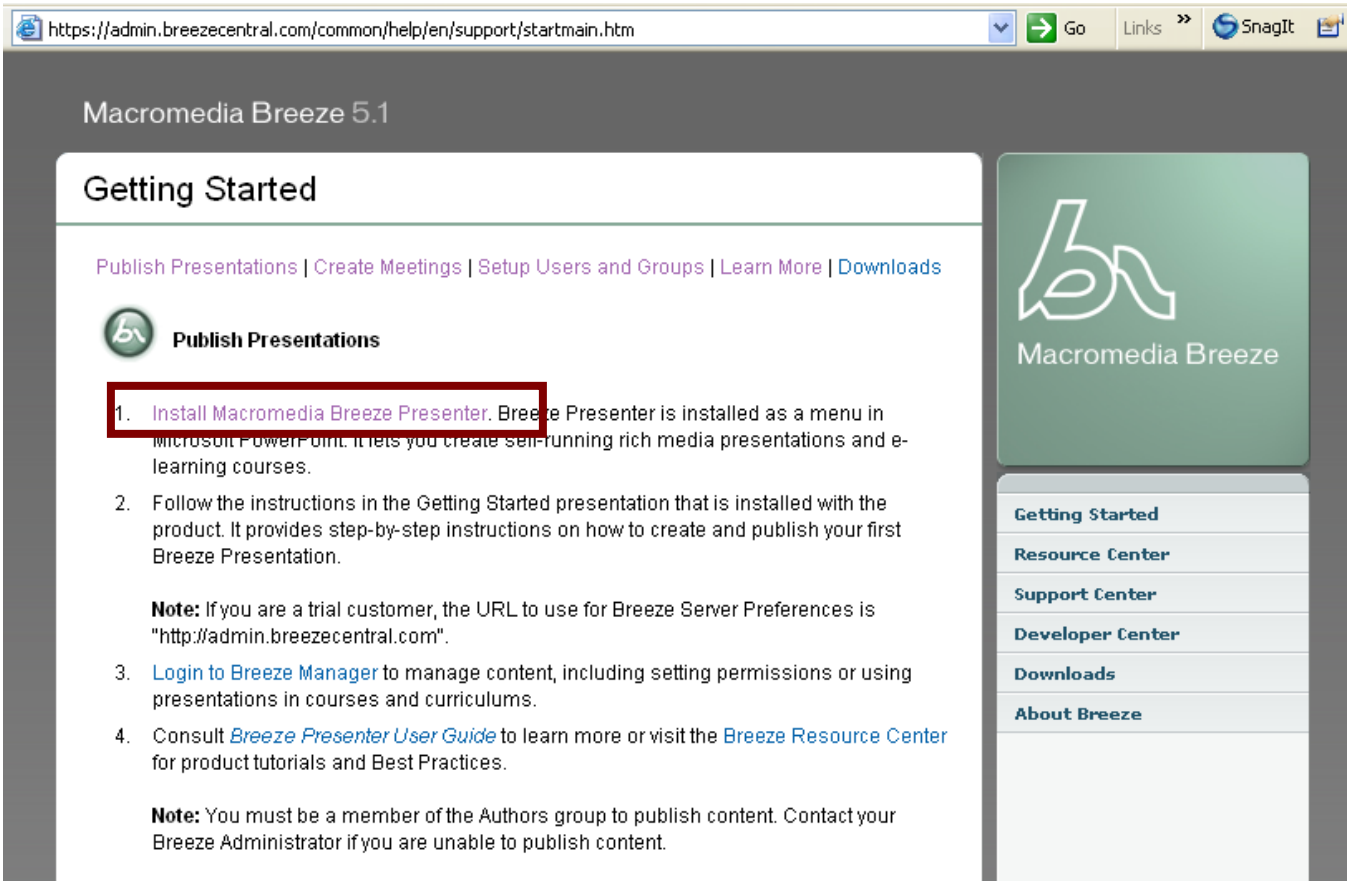
All WBT will be developed using Adobe Breeze Presenter, a PowerPoint to Flash conversion tool. Developers are required to download and install the Breeze Presenter plug-in to develop all courseware.

Jen – should we mention Captivate and Flash here?

Access Breeze Presenter
If you are contracted to develop training with NHI, you may already have a Breeze User Account and an email from Breeze Central notifying you of your Login ID and password. The subject line of the e-mail is the subject line "Macromedia Breeze User Information." In this email, with you will find a "Getting Started Guide" link. (http://admin.breezecentral.com/common/help/en/support/startmain.htm)

If you do not yet have a Breeze User Account, please contact the Knowledge Application Team.

Once logged in to Breeze, you will see a "Getting Started" web page. Click "Install Macromedia Breeze Presenter" to download.



Delivery Environment

Jen, let's talk about Breeze **Training** (LMS) here.

4. Graphical User Interface - Menu and Navigation

Menus and navigational elements help learners move through the courseware. Menus guide the learner to modules, lessons and pages while navigational elements allow for maneuvering through the courseware.

This section addresses the standards for:

- Menu organization
- Navigational elements

Menu Organization

- Course menu is provided on the LMS; modules are listed
- Within each module, provide left-hand navigation (menu) for the following level:
  - **Module level:** Lists Module overview and module summary as well as lessons that are part of each module
- Create the shortest module and lesson titles needed to convey meaning
- Use descriptive headings such as Module 1: Overview
- Use the following common button naming rules:
  - Use Resources to direct learners to course-level ancillary items (additional reading, source documents, policy documents)
  - Use Help to direct learners to navigational guidance
  - Use Glossary to direct learners to a course-level list of terms and definitions

Navigation

Learners should spend time mastering the course objectives, not the course navigation. Navigation must be learner-friendly and must comply with the following standards:

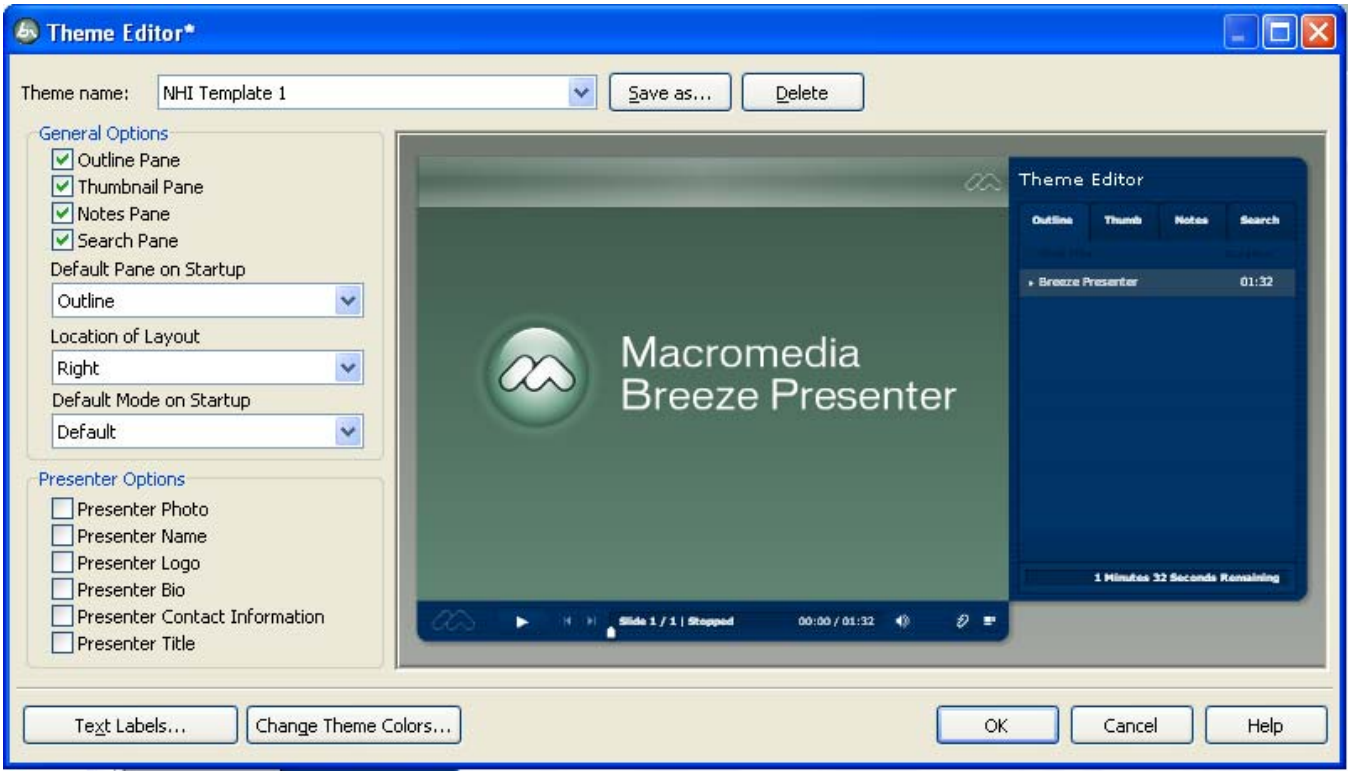
- Provide learners with the ability to control all navigational activities
- Navigation must be intuitive for the learner
- Provide clear instructions or cues for all required learner activities
- Navigational elements should include the following:
    - Resources
    - Glossary
    - Help

    Note: Other navigational buttons may be added, as appropriated
- The location of navigational buttons is specified in the standard NHI GUI
- The buttons (e.g., Submit, Play, Replay) should be consistent within each course; all buttons and icons should have a consistent and unique appearance
- Visual cues, such as mouse cursor changes and rollover highlights, used on all buttons should be consistent
- Navigation through the modules and lessons should be primarily learner controlled; however, a suggested sequence should be provided
- All buttons are labeled with text descriptions or with rollover text
- Navigation buttons should be displayed in exactly the same position every time they appear
- Buttons are grouped logically and located where the learner is likely to be looking
- Learners should have one-click access to Help, Glossary, Resources, Exit Module
- Modules and lessons can be completed in any order, unless the instructional design requires sequential accomplishment (if this is required, instructions to the learners should be provided)
- Identification of module and lesson titles should be utilized (learners should be able to identify where they are within the courseware via a “breadcrumb”)
- Menu items should be listed in sequential or logical order
- Screen titles should use the following title standard (these will show in the sidebar and used for navigation):
    - Module A Overview
    - Lesson 1 > Screen Title
    - Module A Summary

Adobe Breeze Settings

The following standards should be used within Breeze to ensure a consistent user experience.

Navigation and Theme Editor Settings



Theme name: NHI template 1 (NHI Template 1 should be used within Breeze unless specified otherwise. If you have not received this theme from NHI, please contact your NHI ISD.)

General options (check all options):
Outline pane
Thumbnail pane
Notes pane (check only if notes have been included in the notes section. i.e. audio exists)
Search pane

Default pane on startup:
Outline

Location of layout:
Right

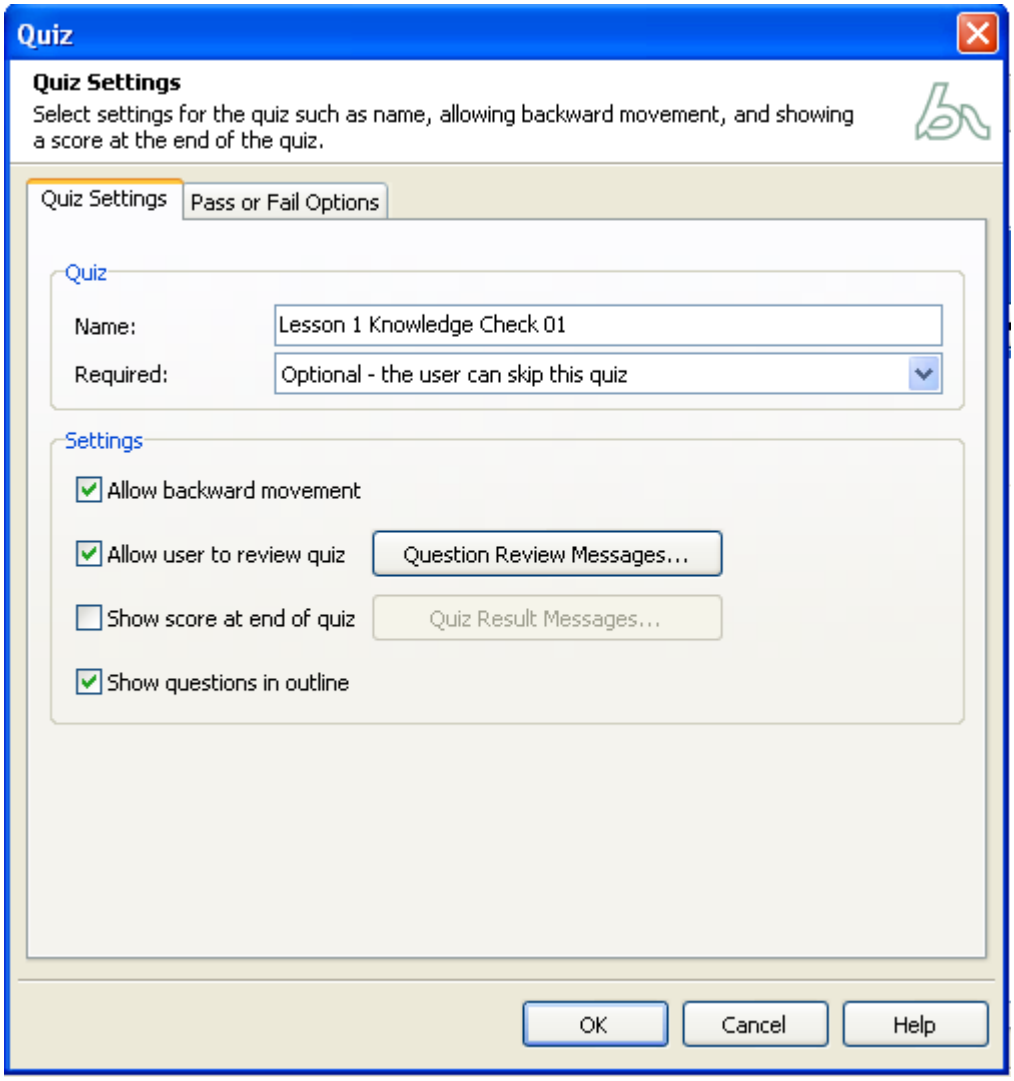
Default Mode on startup:
Default

Presenter Options (un-check all options)

Knowledge Check Settings

Knowledge Checks should be created as ONE question per quiz, or ONE Knowledge Check per quiz.

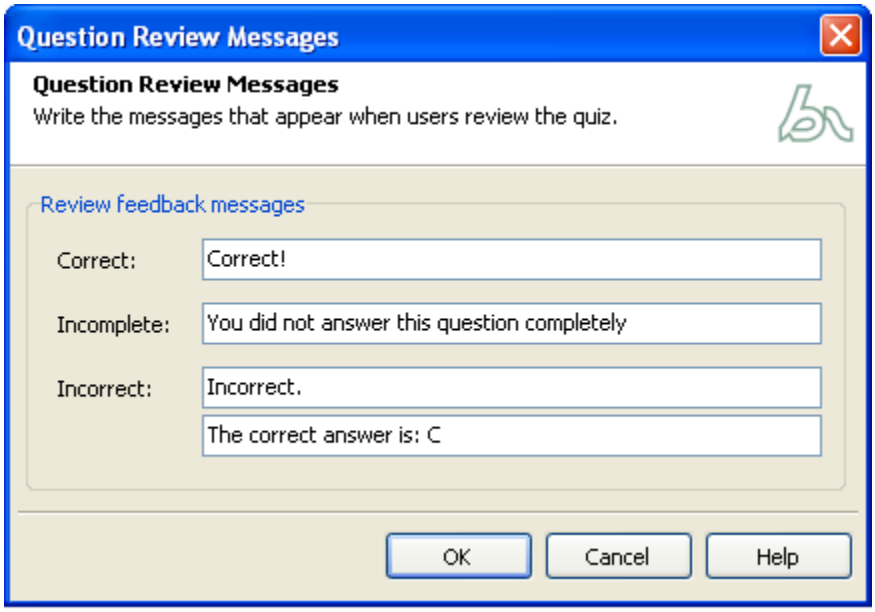
Quiz settings



Name: Lesson x Knowledge Check XX
Required: Optional – the user can skip this quiz
Settings:

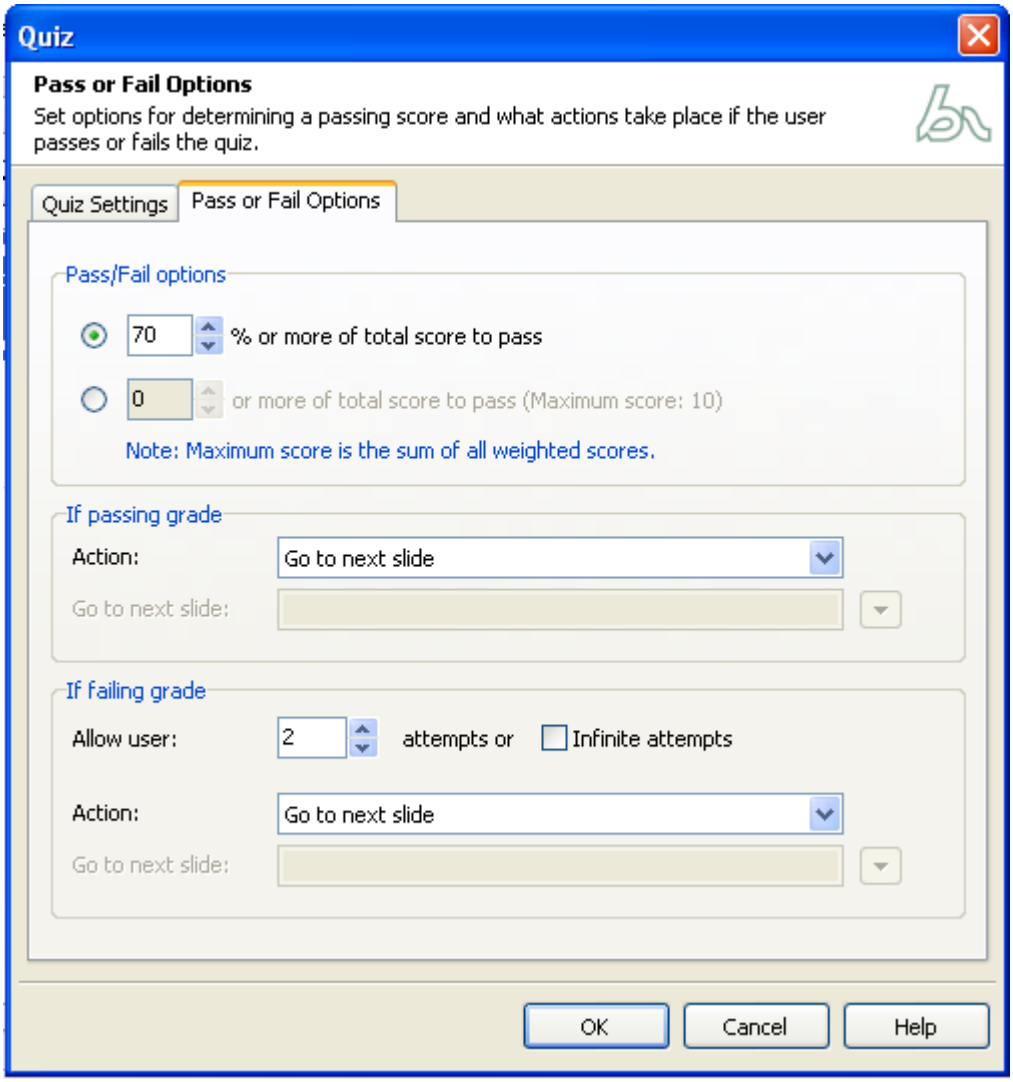
- Allow backward movement
- Allow user to review quiz
- Show questions in outline

Click “Question Review Messages” and set the following messages:



Correct: Correct!
Incomplete: You did not answer this question completely
Incorrect: Incorrect.
The correct answer is: C

Click “Pass or Fail Options” and set the following options:

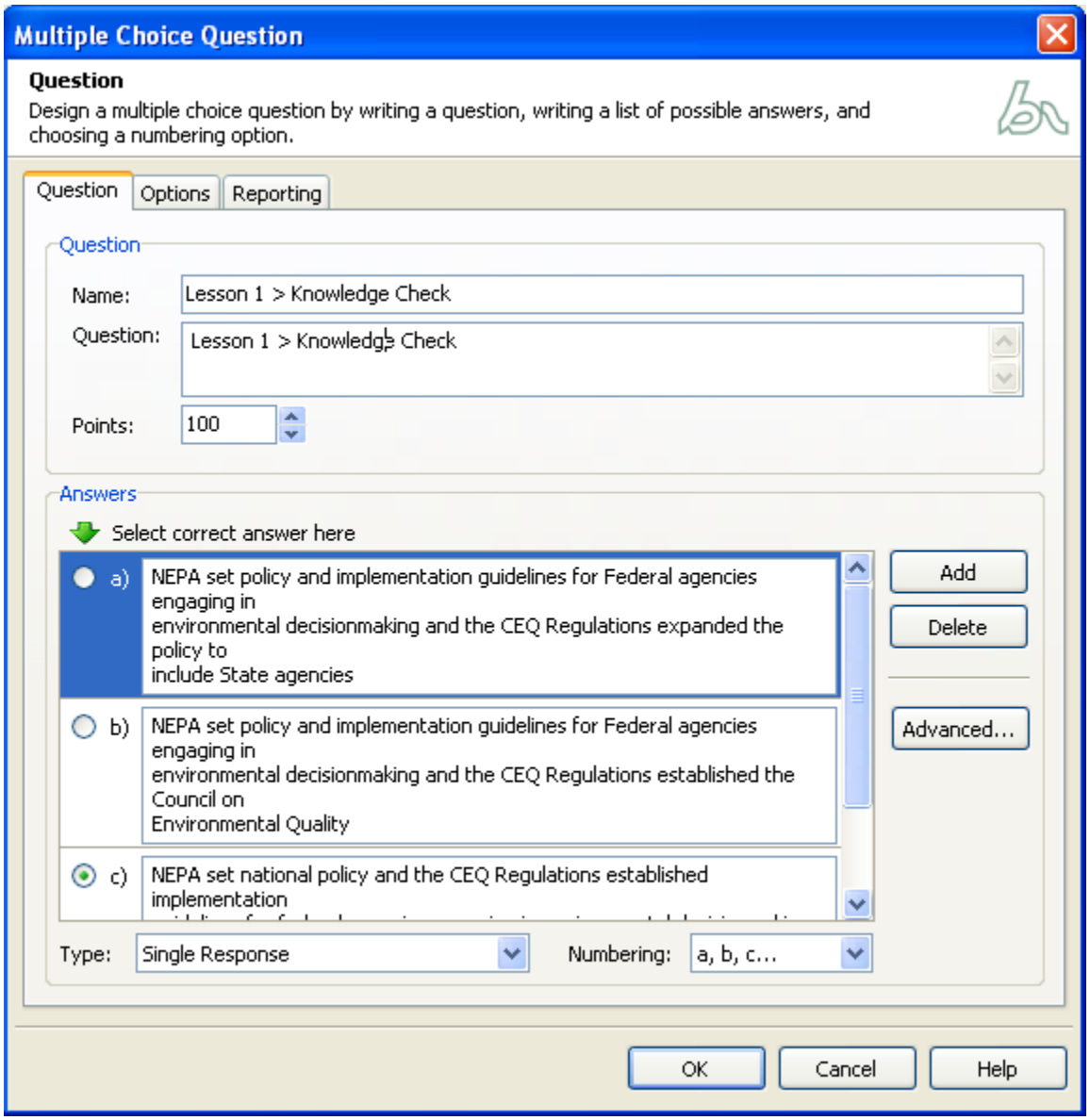


Pass/Fail options:
70%

If passing grade:
Go to next slide

If failing grade:
Allow user 2 attempts
Go to next slide

Question settings



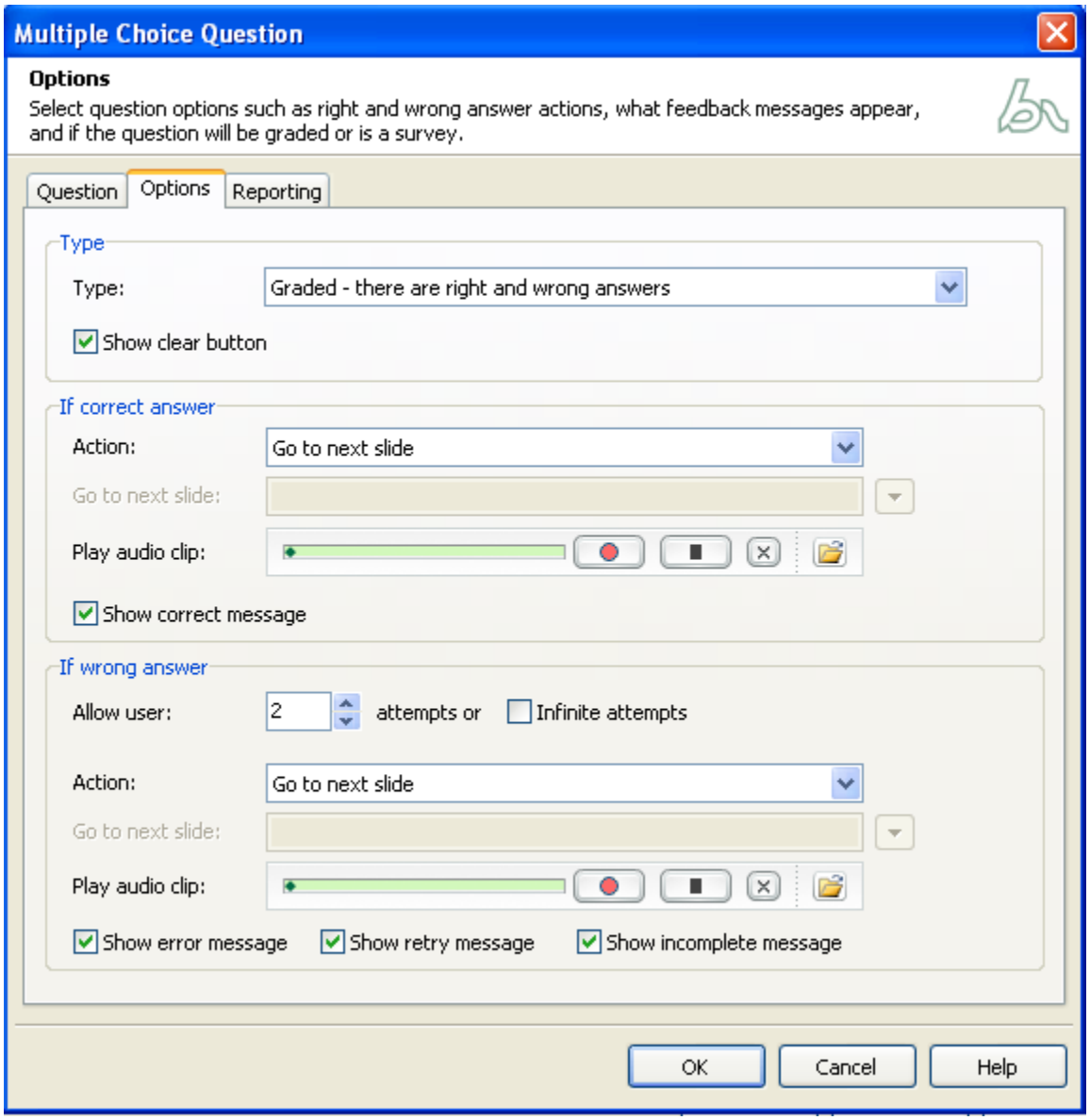
Name: Lesson x > Knowledge Check
Question: Lesson x > Knowledge Check (This question becomes the screen title) Note: the Question will be added on the screen itself.

Points: 100 (since this is the ONLY question within the quiz)

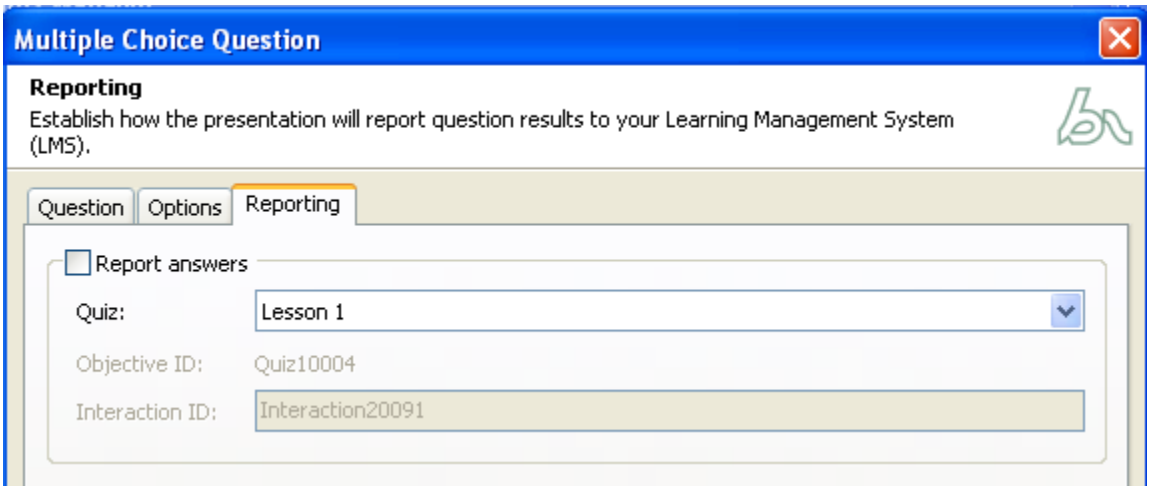
Type: Choose either single response or Multiple responses (if multiple, please state “select all that apply” in the instructional area)

Numbering: Set to lower-case a, b, c...

Question settings - Options



Question settings – Reporting



Do Knowledge Checks get reported?

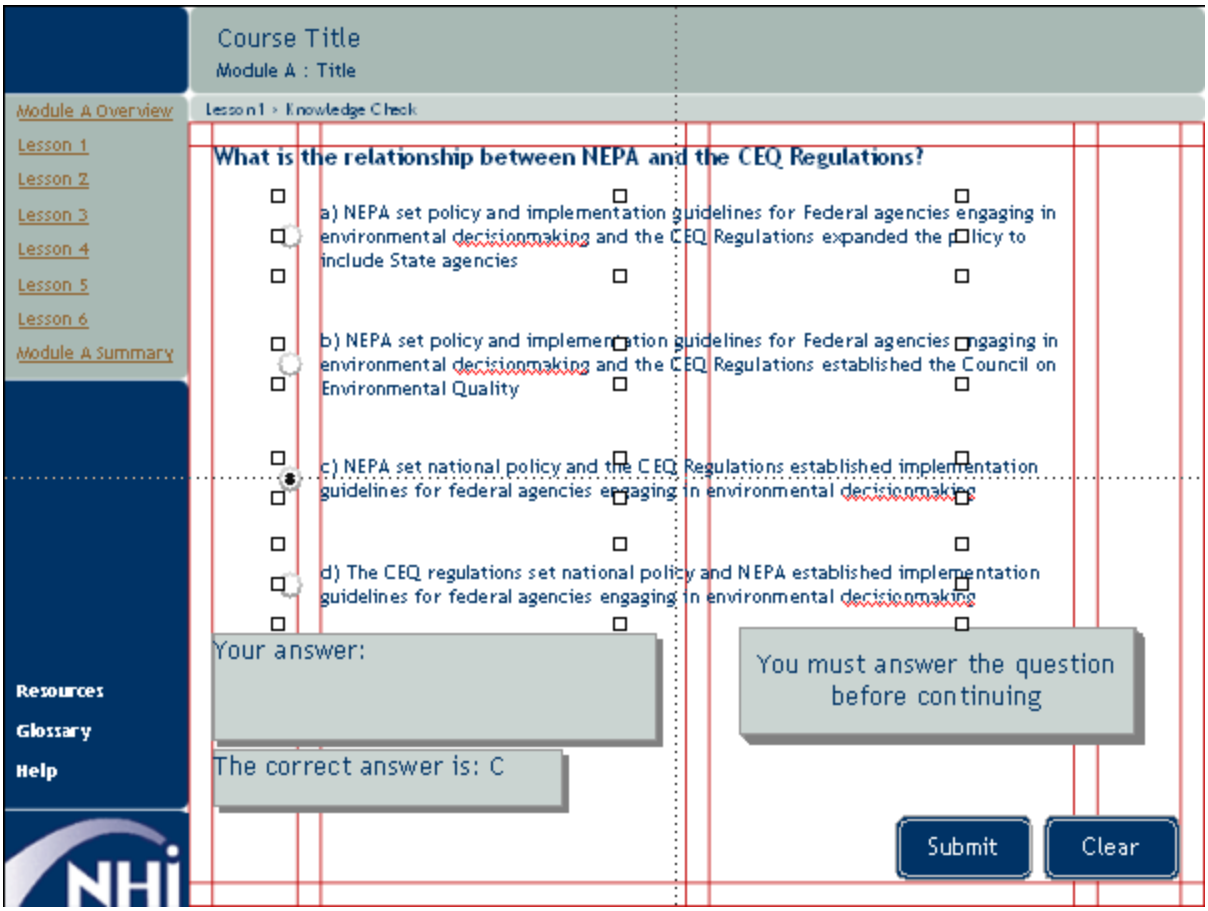
Format Questions on PowerPoint slides

After a Quiz has been created in Quiz Manager, the text will not be using the same size font or color as the master slide. These must be altered manually.

Step 1: Add the Question to the slide in a separate text box. Set font to Trebuchet 14 pt Bold. Align to top-left of grid. Color should be BLUE. Set RGB color 0, 51, 201 on the CUSTOM tab in the colors dialog box.

Step 2: Set answer font to Trebuchet 12 pt. Set RGB color 0, 51, 201 on the CUSTOM tab in the colors dialog box.

Step 3: Format answers. The default text box size is narrower than the grid and will need to fixed manually. Select all answers by holding the SHIFT key and clicking each text box. Go to Format > Object. On the TEXT BOX tab, un-check 'word wrap text in auto-shape'. The text will then run off the page. Put the cursor after the last letter of the last word that fits within the grid. Press the ENTER key while holding SHIFT. Do this for every line of text.



Step 4: Format response boxes. The boxes will also have a different font and color. Set text to Trebuchet 16 pt and RGB color 0, 51, 102. Set box fill color to RGB 202, 212, 209 or the same color as the sub-navigation bar at the top of the screen. Arrange the boxes so that no answers are covered, if possible.

Step 5: Format Submit and Clear buttons. Set box fill color to RGB 0, 51, 102. Font to Trebuchet 14 pt; color: white. Arrange boxes to the lower-right corner as shown.

5. Media Standards

This section defines the standard look and feel for WBT courseware. These standards are used to maintain style consistency within the following areas:

- Screen Design
- Text
- Graphics
- Animation
- Audio
- Video

Screen Design

Use the following standards for general page design:

- Establish specific location for the presentation of instructions and prompts
- Provide recurring information in consistent locations
- Provide generous white space to separate blocks of text

Text

Use the following standards for text layout:

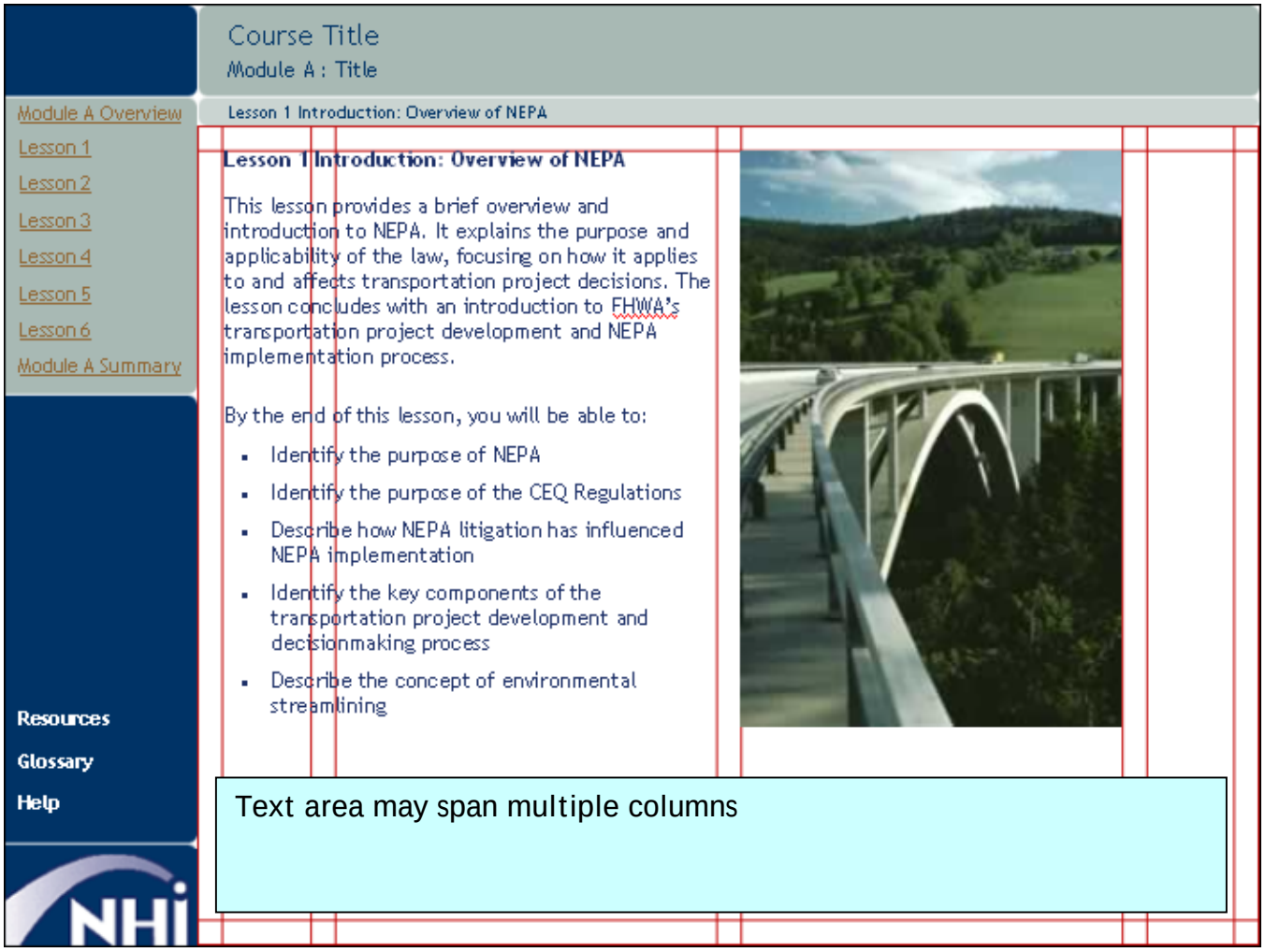
- Present information in a top down, left to right instructional format
- Design text layout in short segments or phrases
- Use bullets, numbered lists, tables and charts to break up lengthy sentences
- Line up text under the first letter in any bulleted list, if the bulleted text wraps to a second line
- Do not indent paragraphs
- Left justify text

Use the following standards for text appearance:

- Use consistent color for text and graphics throughout a course
- Use Trebuchet 16-point for the course title (RGB color: 0, 51, 102)
- Use Trebuchet 12-point for the module title (RGB color: 0, 51, 102)
- Use Trebuchet 10-point for the sub-navigation bar (RGB color: 0, 51, 102)
- Use Trebuchet 12-point BOLD for the Screen title (RGB color: 0, 51, 102)
- Use Trebuchet 12-point for instructional text (RGB color: 0, 51, 102)
- Break up blocks of text to make it easier for the learner to scan the content

- Underline hyperlinks only; glossary words should be hyperlinks
- Use bold font to emphasize a word or phrase.
- Avoid using all capital letters or underlining to emphasize words or phrases
- Use standard Web conventions for hyperlinks (not yet selected, currently being selected, already been accessed)
- Do not use blinking text or repetitive animation

Layout



Text and graphics may span across multiple columns, but must fill the column width for which it occupies.

Graphics

Use the following standards for illustrations and photographs:

- Use an NHI-provided color palette (provided at project onset)

- Use colors that accommodate color-blind learners
- Establish and maintain a convention for the use of color(s) to denote meaning
- Maintain a constant perspective in a series of visuals
- Do not include contractor or other corporate logos in the courseware
- Avoid graphics that may become outdated in a short time
- Do not use clipart
- Do not use “cartoon” characters
- All text within the graphic must be readable. If the graphic needs to be scaled down, then there should be a “click to enlarge” feature
- Be consistent with all graphics (with the use of borders, effects and quality)
- No drop shadows should be used
- Make sure there is no advertising in the photo (e.g., car model name, billboard signs, license plates)

Animation

Use the following standards for animation:

- Allow user to control the start of the animation
- Avoid timed effects (If one or more events are to launch on a page, the learner should trigger the event. Events should not be timed to launch.)
- Do not use blinking graphics or text
- Use special effects when required for emphasis or transition
- Do not use any special effects that detract from learning
- Use animation to display concepts that are difficult to describe with narration and/or text

Audio

Use the following standards:

- Use audio judiciously (e.g., to demonstrate interpersonal skills, to demonstrate sounds heard on the job, to engage the learner – such as providing a talking coach)
- Provide verbatim text that matches audio script
- Ensure that audio volume levels are consistent throughout the course
- Use one audio talent to narrate all modules within the same course. If role-playing, multiple voice talent may be used, but roles must be consistent.

- Use sound effects only when they help to convey the content

Video

Use the following standards to select video for courseware:

- Use video to reinforce, clarify or emphasize a specific behavior or performance objective that cannot be effectively taught using graphics, stills, photographs or animation
- Do not use continuous video clips (more than 15-20 seconds in length) because of file size
- Use appropriate video (e.g., talking head, show and tell, interview, panel discussion, simulation or dramatization)
- Because buffering problems tend to hinder streaming media performance, where possible, avoid traditional techniques such as zooming, panning, transitional wipes, dissolves and fast motion subjects

6. Technical Standards

This section describes standards for specific technical issues related to the courseware. This section includes the following topics:

- Hardware
- Authoring tools
- Data file structure
- Installation

In addition to these standards, all web development and computer security standards specified by FHWA must be followed.

Hardware

The courseware must be designed to perform on the standard hardware configuration in use at the time of development.

Information to determine minimum configuration should include the following specifications:

- Operating system: Windows 2000
- Minimum processor speed: 328 MHz
- Standard screen resolution and color depth 800 x 600, 16 bit

Browser Specification

Internet Explorer 6.0 using Flash Player 6.0.7.9 or higher

Note: Keep in mind that some users may access the courseware over a 56K modem.

Authoring Tools

Courseware should be developed using non-proprietary authoring tools.

Some examples include:

- Flash
- JavaScript

Raw Audio files should be delivered to FHWA as:

- WAV format
- MP3 format

Raw Video files should be delivered to FHWA as:

- Compressed digital files – .FLV or .AVI

Graphic and Photos

- Compressed, processed files with ALT text descriptions for Section 508 – JPEG, GIF – are acceptable for web delivery or CD-ROM
- Adobe Photoshop file format with layers is also acceptable for uncompressed files. Adobe illustrator is acceptable for uncompressed files

Bookmarking

Adobe Breeze has automatic bookmarking. When the user returns to the content, he will be brought to the screen where he left off, assuming the same computer is used for multiple sessions?

Learning Management System (LMS)

Audience Group	Learning Management System	For additional information, go to:
Internal - FHWA Employees	ELMS	
External - Non-FHWA Employees	Breeze Training	

Web Hosting Server

All NHI WBT courseware will reside on the Adobe Breeze Server. This is where the user goes to take the course, register for an event, as well as where test scores and training history are kept for external (non-FHWA) users.

Learner Access to Level 1 Evaluation – UNDER CONSTRUCTION

At the completion of the WBT, the user will be provided a URL to give level I feedback. This evaluation is being hosted by a third-party for all NHI WBT courseware.

Passing Test Scores to the LMS – UNDER CONSTRUCTION

With a SCORM-conformant course, the assessment score is applied at the content object level. For NHI, a module is the smallest launchable unit of instruction. Each new attempt at the post-test will overwrite the previous score value. Plateau also has the ability to create an exam (either internal or external) at the sub-content object level. In this case, a score is recorded for each iteration of the exam, so each attempt produces a separate score.

Deliverable Formats

PHASE	DELIVERABLE(s)	File Format
Planning	Work Plan (tasks, resources, start/end dates, dependencies)	MS Project
Analysis	High-level Design Plan (approach, scope, outcomes)	MS Word
Design	Detailed Design Plan (instructional strategies, media)	PowerPoint
	Prototype Storyboards and Published Prototype (approx. 20 slides)	PowerPoint Flash
Development	Draft PowerPoint Slides and Audio Scripts All Media	PowerPoint Flash
	Beta Published Courseware	
Implementation	Final Published Courseware and Source Files, LMS Testing	PowerPoint Flash
Evaluation*	Test Items as submitted in Beta and Final Courseware	PowerPoint Flash

7. Writing Standards

The section provides standards to be used when screen text for technology-based training courseware. Use the following standards for text language:

- Use active voice, second person (you), present tense, and conversational tone when appropriate
- Keep language simple, concise and consistent
- Write to an 8th Grade reading level
- Do not use hyphens to break words
- Avoid jargon and slang
- Use examples that are universally understood
- Avoid references that learners with English as a second language would have difficulty understanding
- Avoid the use of contractions (unless the course is consistently conversational in style)
- Avoid language and examples that will reduce the shelf life of the courseware (e.g., dates, references to current events)
- Avoid using all capital letters. Learners have more difficulty reading text that is all capitalized than mixed-case letters (and learners perceive all-cap type as being yelled at)
- Italic should only be used for titles of published works and words that are appropriated from other languages and have not become standard English (e.g., *détente)*
- Use “click” (not “click on”) in learner prompts

Acronyms and Abbreviations

- To introduce an acronym for the first time on a page, write out the full name of the entity, followed by its acronym in parentheses
- Acronyms do not include spaces or periods
- Abbreviations should be used when using titles before and after names (e.g., Mr., Mrs., PhD)
- Abbreviations should be used when the acronym for a corporation, institution or country is more familiar than the full name (e.g., USA, IBM, FBI)
- Abbreviations should be used for mathematical measurements (e.g., lb., kg.)

Punctuation

Punctuation Type	Standard
Spaces after punctuation	Use one space after periods and colons
Commas	Do not use serial commas immediately preceding “and” or “or” (a serial comma is the last comma in a series of items)
Hyphens	Use a hyphen to connect words in a sequence (e.g., 2003-2004, pp. 28-72) Do not use hyphens to separate syllables within a word Do not use hyphens to connect two related parts of a sentence
Quotation Marks	Place all punctuation inside the quotation marks
Bullets - symbols	Establish and adhere to a standard symbol for first and second level bullets
Em Dash	Do not use an Em Dash
En Dash	Use an En Dash to connect related parts of a sentence (e.g., NHI expects the vendor to ensure – through thorough quality testing – compliance to this Guide, SCORM/AICC, and Section 508.) Use a space before and after an En Dash (as shown in example above) An en dash is the same length as the small letter “n.” In html, an En dash is: –

Bullets

- Maintain parallel construction in a bullet list (e.g., start all bulleted items with a verb)
- Use no more than two levels in a bulleted or numbered list
- Use numbered bullets where sequence is important (e.g., the five sequential steps of the ADDIE model); use symbols for bullets when order is not important
- Use a colon at the end of the introductory sentence (i.e., stem of before bullet list)
- Capitalize the first word in each bulleted phrase or sentence
- Do not place a period at the end of learning outcomes, even when stated in a complete sentences
- Begin phrases (bulleted items that are not complete sentences) with caps and end without punctuation
- Do not use “and” or “or” in bulleted sequences
- Do not use a comma after each bulleted item
- Do not put a period at the end of the last bullet in a list of bulleted items

- Do not use a bullet (number or symbol) when there is only one item; there must be at least two items to make a bullet list

Numbers

- Use figures to express the numbers 10 and above, as well as all numbers representing mathematical functions or quantities, dates, ages, time, money and numbers as part of a series
- Spell out the numbers nine and below unless they represent precise measurement (e.g., 8.2578) or are part of a complex mathematical formula
- Spell out any number that begins a sentence, title or heading

Date and Time

- Write out the date in full (e.g., July 4, 1776)
- Use a colon to separate hours and minutes (e.g., 9:00 a.m.)
- Include Tim Zone (EST, CST, MST, PST), if applicable

Capitalization

- In headlines, capitalize all words except definite/indefinite articles, prepositions and conjunctions that are shorter than four letters.
- When using bullets, capitalize the first word contained in each bullet
- Capitalize the word “State” whenever referring to one of the 50 States
- Capitalize the word “Federal” as in Federal Government
- Do not capitalize the word “federally”

Emphasis

- Avoid excessive use of bolding (it can be distracting and should be reserved for headings)
- Do not use italics for emphasis (they are hard to read on screen and are used specifically for citations)
- Do not underline (underlined text can be confused with a hyperlink)
- Do not use quotation marks for emphasis
- Use headings and subheadings to draw attention to specific concepts

8. Assessment Standards

This section provides general guidance on the assessment of learner mastery of course content.

Level One Evaluation

Upon completion of a course, learners will be encouraged to complete a Level 1 Course Evaluation, on line.

The learner accesses the course evaluation via a URL.

Level Two Evaluation

In order to qualify for IACET continuing education credits (CEUs), all NHI courseware must include an assessment of the learners' mastery of the course learning outcomes. All learning objectives must be tested.

The threshold for mastery is 70% for each module test.

Learners may take the test as many times as they wish. (What score(s) are sent to the LMS for repeated attempts?)

Whenever a learner returns to the course menu, any modules associated with tests that were successfully passed will be clearly marked as being completed. This will allow learners to better track their progress in the course.

The NHI Learning Management System (LMS) is the training database that will track the learners' progress through online courses, as well as their pass/fail status on the course tests. Only after a learner successfully passes all module tests will the LMS reflect a "passing" status for a course.

Please see the section on Standard NHI WBT Screens Types for additional information on the structure of module tests.

Levels Three and Four Evaluation

Though not required by policy, NHI welcomes discussion of performance evaluation at levels three and four.

9. Section 508 Compliance

This section provides information relevant to Section 508. All NHI technology-based training products must be in compliance with these standards.

The following statement summarizes Section 508, Part 1194.21 regarding software applications and operating systems:

> *Most of the specifications for software pertain to usability for people with vision impairments. For example, on provision requires alternative keyboard navigation, which is essential for people with vision impairments who cannot rely on pointing devices, such as a mouse. Other provisions address animated displays, color, and contrast settings, flash rate, and electronic forms, among others.*

508 Compliance Standards

Courses must be accessible to persons with disabilities in accordance with section 508 of the Rehabilitation Act Amendments of 1998. Proposals should address how the course would meet the requirements of this Act.

The Contractor will coordinate with the Contracting Officers Technical Representative (COTR) for overall technical direction. The COTR will convene designated U.S. Department of Transportation (USDOT) staff to serve as technical experts, and assist in the review and approval of course materials. Technical experts will represent USDOT, as appropriate.

The Final Rule, Electronic and Information Technology Accessibility Standards, published in the Federal Register on December 21, 2000, provides guidance on how a Contractor can meet these requirements (see, 36 CFR Part 1194 [Docket no. 2000-01] RIN 3014-AA25). There are also a number of readily available resources on the Rehabilitation Act including several web sites. See, for example, www.section508.gov and www.access-board.gov. Additionally, a number of organizations provide technical information on making websites accessible for the disabled. Such organizations include but are certainly not limited to:

- The Web Consortium (www.w3.org)
- The HTML Writers Guild (www.hwg.org)
- The Rochester Institute of Technology's Equal Access to Software and Information website (www.rit.edu/~easi/)
- The University of Wisconsin-Madison's Trace Research and Development Center (www.trace.wisc.edu)

See also:

Janet L. Balas. Online Resources for Adaptive Information Technologies, Computers in Libraries (June 1, 1999).

Marilyn J. Cohodas. Does Barrier-Free Compute[correct title?], Governing Magazine (April , 2000).

The requirements for Web-based applications as described in § 1194.22 the December 21, 2000 Final Rule, e.g.:

(a) A text equivalent for every non-text element shall be provided (e.g., via "alt", "longdesc", or in element content).
(b) Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.
(c) Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.
(d) Documents shall be organized so they are readable without requiring an associated style sheet.
(e) Redundant text links shall be provided for each active region of a server-side image map.

(f) Client-side image maps shall be provided instead of server-side image maps except where the regions cannot be defined with an available geometric shape.
(g) Row and column headers shall be identified for data tables.
(h) Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.
(i) Frames shall be titled with text that facilitates frame identification and navigation.
(j) Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.
(k) A text-only page, with equivalent information or functionality, shall be provided to make a Web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.
(l) When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.
(m) When a Web page requires that an applet, plug-in or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with § 1194.21 (a) through (1).
(n) Whenever electronic forms are to be completed online, the forms shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.
(o) A method shall be provided that permits users to skip repetitive navigation links.
(p) When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.

Note to § 1194.22: 1. The Board interprets paragraphs (a) through (k) of this section as consistent with the following priority 1 Checkpoints of the Web Content Accessibility Guidelines 1.0 (WCAG 1.0) (May 5, 1999) published by the Web Accessibility Initiative of the World Wide Web Consortium:

Section 1194.22 Paragraph	WCAG 1.0 Checkpoint
(a)	1.1
(b)	1.4
(c)	2.1
(d)	6.1
(e)	1.2
(f)	9.1
(g)	5.1
(h)	5.2
(i)	12.1
(j)	7.1
(k)	11.4

2. Paragraphs (l), (m), (n), (o), and (p) of this section are different from WCAG 1.0. Web pages that conform to WCAG 1.0, level A (i.e., all priority 1 checkpoints) must also meet paragraphs (l), (m), (n), (o), and (p) of this section to comply with this section. WCAG 1.0 is available at:

http://www.w3.org/TR/1999/WAI-WEBCONTENT-19990505

9. Quality Assurance

This section describes NHI's expectations for quality assurance efforts performed by development teams.

It is NHI's expectation that the development team will conduct quality assurance testing on all deliverables prior to submission to NHI. Quality assurance is to be performed on all draft and final deliverables from each phase of the ADDIE process.

In particular, NHI expects the development team to:

- Ensure that all teaching and testing strategies comply with the standards provided in this Guide
- Ensure that all text complies with the standards provided in this Guide
- Ensure that all media with the standards provided in this Guide
- Conduct Alpha test on all supported operating systems and browsers
- Perform LMS integration testing
- Conduct thorough quality assurance testing on Alpha, Beta, and Final versions

The role of NHI is to review for **content** accuracy. NHI expects the development team to ensure – through thorough quality testing – compliance to this Guide, SCORM/AICC, or Section 508.